Evaluation of Position Description

Labor Category/FLSA: Nonexempt

_____**Current Position Description**
__X__**Proposed Position Description**

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Approving Official: **Name:** Sheryl A. Wheeler **Signature:** [signature]
Title: HR Specialist

Position Title/Series/Grade: Maintenance Mechanic (Refrigeration), WG-4749-11

ORGANIZATION: Division of Property Management

References: Federal Wage System, Job Grading Standards: Maintenance Mechanic Series, WG-4749, 5/74; Boiler Plant Operating, WG-5402, 3/91; Pipefitter Series, WG-4204, 3/69; Air Conditioning Equipment Mechanic Series, WG-5306, 6/ 71; Heating and Boiler Plant Equipment Mechanic Series, WG-5309, 11/92; Electrician Series, WG-2805, 6/89; Electrical Equipment Repairer Series, WG-2854, 4/94; Industrial Equipment Mechanic, WG-5352, 11/80; WG-5310.

TITLE AND SERIES DETERMINATION: The subject position is involved in the maintenance and repair of grounds, exterior structures, buildings, and related fixtures and utilities, requiring the use of a variety of trade practices associated with occupations such as carpentry, masonry, plumbing, electrical, air conditioning, cement work, painting, and other related trades, and the performance of the highest level of work in at least two of the trades involved. This position requires kills and knowledge of various blue collar trades utilized in performing maintenance, repair and operation of a large volume of difference equipment, materials, and maintenance items requiring separate trades knowledge. This position is established to perform a variety of nonsupervisory maintenance work at the DHHS, NIH. Incumbent serves as the full journeyman level in operation, troubleshooting, maintenance, and repair of the high pressure boilers, centrifugal refrigeration units, air compressors, and their associated auxiliary equipment. Incumbent performs a wide range of duties which requires an extensive knowledge of high-pressure boiler, centrifugal compressor Based on this requirement, the Maintenance Mechanic standard was used. Based on this standard it shows that when there are more than one occupation being performed at the same grade level, then the 4749 series and title are to be used, however, if one of the occupations is graded higher than the other occupations then the higher graded occupation would determine the title and series of the position. Based on this review, the title and series, Maintenance Mechanic (Refrigeration), WG-4749 is the appropriate title and series for this position.

GRADE DETERMINATION: Work requirements entails a number of trades applications, of which the predominant work is several series at journeyman grade level WG-11 explained in job description. Remaining trades are predominantly at other levels and not above WG-11. Incumbent repair and maintenance activities on large and complex industrial centrifugal compression refrigeration units; services equipment which is characterized by extremely close tolerances between contact and wearing surfaces; applies a variety of methods procedures and techniques to layout, install, align, repair, overall and maintain all of the boilers and auxiliary equipment in the plant; disassembles and reassembles equipment; monitors, adjusts, and controls all phases of boiler plant operation; monitors all pressures and temperatures on the refrigerant, water and oil systems for unit and takes immediate corrective action when readings are out of range; operates and maintains the central compressed air plant consisting of two 1500 cfm and one 3000 cfm centrifugal compressor units, etc. In application of grading criteria for Maintenance Mechanic positions, WG-4749, job is graded at WG-11 based on the performance of journeyman level.

CONCLUSION: Work depicted in the duties are properly considered in accordance with the WG-4749, Maintenance Mechanic series. Duties are described at the WG-11, none being above WG-11. In accordance with the classification practices and titling prescribed in the WG-4749 Series standard. The proper classification for subject job is therefore determined to be Maintenance Mechanic, WG-4749-11.

Maintenance Mechanic (Refrigeration)
WG-4749-11

Introductory Statement:

The Division of Property Management (DPM) serves all of the NIH Community by providing support for renovations, new construction and maintenance of existing facilities, utilities and grounds. The Division provides professional leadership for the engineering programs of the National Institutes of Health (NIH). The scope of DPM operations is such that the effectiveness with which they are carried out has a major and direct effect on the worldwide biomedical research programs of the NIH. In addition to the main facilities at the Bethesda Campus and in Poolesville, MD, NIH has facilities at Research Triangle Park, North Carolina, Rocky Mountain Laboratory in Montana and the Gerontology Research Center in Baltimore, MD.

This position is organizationally located within the DPM in one or more of the subordinate organizational components responsible for the provision of operations and maintenance of NIH facilities. The position is multi-disciplinary and requires the incumbent to be multi-skilled and flexible in the types and complexity of work performed. The position requires that the incumbent be able to work independently and take the initiative to complete the work assigned with a minimum of direct supervision regardless of the nature of the work thus requiring that specific trade skills be shared between staff members.

Major Duties

Incumbent serves at the full journeyman level in operation, troubleshooting, maintenance, and repair of the high-pressure boilers, centrifugal refrigeration units, air compressors, and their associated auxiliary equipment. Incumbent performs a wide range of duties which requires an extensive knowledge of high-pressure boiler, centrifugal compressor refrigeration, and compressed air systems. Incumbent spends approximately 95% of their time as a mechanic and 5% as an operator. Major work assignments include:

As an Air conditioning equipment mechanic, incumbent performs repair and maintenance activities on large and complex industrial centrifugal compression refrigeration units.

Work involves troubleshooting and recognizing the cause of faulty equipment on various large and complex refrigeration units and systems that provide specific and critical chilled water for laboratories, research facilities and hospital experimental activities. Incumbent services equipment which is characterized by extremely close tolerances between contact and wearing surfaces which are required to maintain proper lubrication of the metal surfaces and sealing of the refrigerant gases.

Incumbents troubleshoot, repair, overhaul, modify, test, align and install such major items and complex equipment as; compressor impellers; sleeve, thrust and roller bearings; helical, pinion and tapered gears; labyrinth, balance piston and oil seals; shaft seal assemblies; jet pumps; pre-rotation vane assemblies; high speed gear reducers; flexible and rigid couplings; and refrigerant float and hot gas by-pass valves and operations.

As a boiler plant equipment mechanic, incumbent applies a variety of methods, procedures and techniques to layout, install, align, repair, overall and maintain all of the boilers and auxiliary equipment in the plant. Supports the maintenance and repair of all the mechanical equipment in the incinerator plant. All of this equipment and machinery have complex interrelationships among components and diagnosis of trouble is very difficult due to various possible causes and combinations of factor that may be the source of trouble.

Incumbent disassembles and repairs all of the mechanical machinery, equipment and systems such as high pressure boilers that maintain prescribed boiler temperatures and pressures, systems of steam production and distribution, all types of pumps, steam turbines, pre-heaters, economizers, baffles, soot blowers, flexible and rigid couplings, air compressors, conveyers, diesel engines and gearboxes drives. Determines the nature and extent of repairs necessary and makes needed repairs by replacing, reworking, or refinishing worn or damaged parts and components.

Incumbent reassembles and installs the equipment, performs operational and functional tests, and makes required adjustments in order to ensure proper operation of the entire system. Checks and test trips on turbine governors, and replace bearings, mechanical seals, and casing packing. On steam turbines, incumbent removes turbine casings, and inspect and replace components such as rotating and stationary turbine blades, steam gland seals, ball and sleeve bearings, thrust bearings, and drive gears. Removes the turbine governor, checks the control and safety trip linkages and springs, replaces gaskets and damaged parts, reassembles the unit and tests it for proper operation.

Also performs routine maintenance work on the boilers which includes patching brickwork in boilers, turbining tubes, cleaning and inspecting boiler drums, dismantling pumps, turbines, valves, steam traps, steam lines, and water lines. Uses all tools and instruments of the trade and does maintenance on all auxiliary equipment, boilers, refrigeration equipment, air compressors, etc. Maintains a neat, clean, and orderly work area.

As a boiler plant operator on a rotating shift, incumbent starts, operates, adjust, stops, maintains and perform various operational repairs any or all of the multiple boilers and associated auxiliary and pollution control equipment. These boilers are capable of being fired on No. 2 fuel oil, natural gas or combustion of these fuels to produce high-pressure steam to meet a constantly changing load.

Observes, coordinates and controls operation of one or more boilers in the plant. Through the use of pneumatic or micro-processor based controls, the incumbent manually or in automatic mode, maintains efficient combustion levels and ensures compliance with air pollution laws and regulations. Monitors, adjusts, and controls all phases of boiler plant operation. Uses electronic and pneumatic controls and log charts readings, in conjunction with meters, gauges and computer generated data to determine adjustments or corrections necessary for proper operations or changing load requirements.

Operates and adjusts auxiliary and pollution control equipment such as; forced and induced draft axial fans; centrifugal, reciprocating, diaphragm and vacuum pumps; condensate de-aerators, steam turbines, heat exchanger, water softeners, bearing cooling water systems, and ash ejectors. Adjusts fuel feeds, atomizing steam, air volume, firebox draft and feedwater to achieve maximum combustion efficiency with changing load demands or variations in fuel quality.

Regularly observes and notes reading on gauges, meters, vibration detectors, recorders, drum level indicators and microprocessor displays to detect danger signals in operations. Checks the operation of safety equipment such as flame scanners, purge duration cycle, low water cutouts, high pressure cut-outs and related alarms. Checks for the probability of steam leaks by visual and audible exploration of the probable reasons for equipment failure.

As a air conditioning equipment operator on rotating shift, incumbent starts, steps, operates, adjusts, and continuously monitors the large electrically driven centrifugal compression refrigeration units and associated auxiliary equipment including cooling towers, chilled and condenser water pumps, make-up water to the cooling towers chemical feed systems, steam reducing stations, etc. Assures the proper chilled water temperature for out going and return water at maximum efficiency.

Monitors all pressures and temperatures on the refrigerant, water and oil systems for the unit and takes immediate corrective action when readings are out of range. Makes changes to equipment operation without disrupting plant operations or proper chilled water supply. Troubleshooting operational problems by locating and checking various elements such as those which control low and high side pressures; the temperature of the refrigeration units; the temperature of the liquid and suction lines; and the running time of the various pieces of equipment.

Operates and maintains the central compressed air plant consisting of two (2) 1500 cfm centrifugal compressor units and one (1) 3000 cfm centrifugal compressor unit.

Starts, stops, monitors and regulates the boiler feedwater pump, condensate pump and bearing cooling water systems. Insures proper operating conditions, pressures and temperatures, and switches pumps as necessary to meet plant boiler demands. Tests two 300,000 gallon water softeners and regenerates and adjusts chemicals and water flow when necessary to assure efficiency.

Receives fuel oil into main tanks (two tanks of 529,00 gallons each) and transfers oil to day tans and operates necessary equipment to accomplish this. Verifies that proper amount of oil is delivered. Makes security check on incinerator equipment and starts and stops as necessary. Operates numerous sump pumps and various heating and ventilating systems in the plant.

Assures that established plant procedures are followed and that all safety precautions are observed. Conducts a complete physical check of plant on a regular basis during shift where all auxiliary equipment is inspected and checked. Remains constantly on the alert to detect malfunctioning equipment and takes necessary steps to prevent equipment stoppage and breakdown. Makes security check on incinerator equipment and starts and stops as necessary.

Directs, trains and instructs lower grade employees. Conforms to all safety rules of the plant and is familiar with all casualty control drills and the PPS Instruction Manual.

Performs other related duties as assigned.

Skills and Knowledge

At the full journeyman level, incumbents have the skills and knowledge to A) maintain, repair, disassemble, re-assemble and install all of the mechanical systems in the refrigeration plants, B) maintain, repair, disassemble, re-assemble and install all of the mechanical systems in the boiler plant, C) to operate all of the equipment and systems in the refrigeration plant and D) to operate all of the equipment in the boiler plant.

As a boiler and refrigeration plant equipment mechanic incumbent applies an extensive and comprehensive knowledge of the maintenance and repair of large, unusually complex and heavy duty industrial plant equipment, machinery and mechanical systems associated with large, high-pressure boiler and refrigeration plants.

Incumbent has a comprehensive trade knowledge of the operating principle related to boilers and centrifugal refrigeration and is familiar with the functional relationships and the impact of repairs on all of the related devices of the equipment serviced. Work requires the ability to read and interpret complex multi-technical material to troubleshoot and isolate malfunctions in such devices as steam turbine governors, cyclone separators, high speed gearboxes, couplings, mechanical seals, large sleeve bearings, refrigerant floats, high pressure pumps, air compressors, etc.

Incumbent must develop modifications and improvements to standard procedures and work practices, and implement such changes to equipment and operating specifications. In addition in using a wide variety of trade tools and measuring devices, incumbent adapts such tools and devices for special applications such as measuring critical bearing and seal clearances, alignment between motors, gearboxes and the driven equipment, rigging out heavy and bulking pieces of equipment, and installing new equipment.

Assignments are received with minimum instruction and require critical judgments and decisions because there are fewer technical guides on the more demanding work such as; troubleshooting the various items and equipment under simulated or actual operating conditions; isolating the problem to the particular component or assembly; and performing repairs which are often complicated by critical tolerance and accuracies which require the use of precision micrometers, dial indicators and computer aided alignment tools.

As a boiler plant operator, incumbent applies a comprehensive knowledge of all operational phases of heating boiler plant operations and their interrelationships for efficient and economical generation of high-pressure steam, utilizing microprocessor control system.

Understands the principles of high-pressure steam generation including heat of evaporation and condensation, heat transfer, conduction, radiation, convection, etc. Has the knowledge of combustion components CO, 02, H20, sulphur, etc., and the proper firing of boilers to get maximum combustion efficiency with minimum air pollution. Understands the method of analysis of stack gases, boiler efficiency and corrective measures which should be taken when CO and 02 are out of proper proportions.

Has the skills in the procedures and adjustment necessary to start, operate, adjust and troubleshoot the boiler plant to meet load demands and maintain efficient levels of combustion and compliance with air pollution laws. Is familiar with the plant casualty control drills and the correct procedures or actions necessary to avoid a plant shutdown or damage. Has the skill to read and analyze information from numerous gauges, meters, recorders, analog and digital displays, and computer generated data to determine the operational status of the facility and to make any necessary adjustments.

Incumbent is skilled in combustion techniques and adjustments to firebox variables such as fuel flow, fuel/air ratio, temperatures, and combustion time to control chemical pollutants in the flue gases and to maintain combustion efficiency.

Has the knowledge and skills to properly operate the various auxiliaries on the steam boilers such as reciprocating, centrifugal, gear, and rotary pumps, forced and induced draft fans, turbines, bearings, pressure lubricating systems, oil seals, governors, fuel oil heaters, soot blowers, automatic feed-water regulators, de-aerators, combustion controls, and numerous other equipment. Has the ability to make proper adjustments to the equipment named, and to diagnose operating problems and make appropriate emergency repairs.

As refrigeration plant operator, incumbent understands the principles and theories of compression refrigeration and the related theories and cycles, such as; heat flow through radiation, convection and conduction; specific, sensible, latent an total heat; the refrigeration cycle, compressor surging, heat transfer laws, the use of the refrigeration tables; and the pressure-temperature characteristics of a refrigeration system in order to locate faulty equipment swiftly to reduce inoperative time to a minimum.

Has the ability and knowledge to operate the compressors, pumps and cooling towers to provide the desired chilled water temperature in an efficient and effective manner. Can detect abnormal operating conditions that could seriously damage the unit, and takes immediate corrective action to change or shut down the unit. Understands the function of the centrifugal compressor, evaporator and condenser sections, cooling towers, hot gas bypass, interstage cooler, liquid subcooling, pumping hydraulics and pumping systems, and how they all operate together to produce chilled water.

Has the ability to operate large refrigeration units simultaneously, each of which contains a large amount of components, controls, gauges, and auxiliary equipment. Has the ability to troubleshoot the unusual equipment malfunctions using numerous testing techniques, gauges, meters and low instruments. Has the ability to quickly and expertly find the source of the problem and determine the nature and extent of repairs or adjustments needed.

Responsibility

The incumbent has a wide range of responsibility for a variety of different operations and equipment to complete assignments. Independently determines proper work sequence on equipment involving many components and close tolerances. Work requires a high degree of accuracy and precision when dealing with large bearings, seals and linkage.

Receives general instructions from the foreman and/or leader and then normally proceeds on own. Work is checked generally for continuity of operation and maintenance of plant equipment and effectiveness of work procedures. Both adherence to prescribed timely reading and recording tasks and quick and appropriate response to emergency situations prevents possible damage to equipment, excessive smoke, or utility outage which could result in a great loss in research effort at NIH.

Performs duties with minimum supervision. Makes independent decisions and determinations on proper maintenance and operational duties. Must modify technical instructions in order to complete work because of unusual nature of equipment being worked on. Incumbent independently changes work instructions or procedures based on knowledge and skills in the trade. Many assignments require incumbent to make immediate decisions and judgments on own which will affect the quality and adequacy of the work performed.

Physical Effort

Frequently hurries to his station during times of emergencies to avoid (1) possible damage to equipment, (2) excessive smoke or (3) utility outage. May have as little as 30 seconds to solve emergency situations before equipment automatically stops. Uses his hearing, eyes, sense of smell and feel. Climbs ladders, crawls, bends, stoops, crouches,

lifts up to 100 pounds, etc. Prolonged standing, walking on concrete floors, climbing stairways and ladders. Light to moderate effort in turning valves and operating controls. Occasional stacking and moving of equipment and supplies. Heavy lifting of machinery parts, hoods, etc. in dismantling, inspection, etc.

Working Conditions

Normally, work is performed inside plant, but incumbent may frequently go outside during inclement weather. He is exposed to the hazards of working around running machinery, including exposure to extreme temperature, noise, boiler explosions, steam leaks, soot, scalding water, hot oil, burns from hot surfaces, and toxic amounts of chemicals, gas, fumes, and odors. Working environment is not air conditioned during the heat of summer when temperatures are aggravated by heat derived from the boilers.

Other Significant Factors

Required to have certifications for CFC servicing and fork lift operation. May be assigned as Acting BPO Leader (Maintenance) during scheduled or emergency leave of the BPO Leader (Maintenance).